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# Quality of Life and adolescents' communication with their significant others (mother, father and best friend) in adolescents: The mediating effect of attachment to pets.

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## Author Note

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# Quality of Life and adolescents' communication with their significant others (mother, father and best friend): The mediating effect of attachment to pets.


## Abstract

The relationship between adolescents' communication with their significant others (mother, father and best friend) and quality of life (KIDSCREEN) was investigated in 2262 Scottish adolescent pet owners. The variable attachment to pets was also tested and assessed as a mediator of this relationship.

A positive relationship between adolescents' communication with their significant other (mother, father and best friend) and quality of life decreased when controlling for attachment to dogs. In cat owners, a positive relationship between communication with a best friend and quality of life decreased when controlling for attachment to cats. In cat and dog owners, attachment to these pets predicted higher levels of quality of life. Higher attachment to dogs and cats was explained by good communication with parents and best friends. Mediation effects of attachment to dogs and cats might be explained in terms of the caring activities associated with these types of pets.



Keywords: Attachment to pets, Quality of Life, communication, parents, best friend, adolescence.

## Introduction

More than 50% of the households in Western countries keep pets, mainly dogs and cats (Barker, Rogers, Turner, Karpf, & Suthers-McCabe 2003; Downes, Canty & More 2009; Marsa-Sambola et al., 2015; Murray, Browne, Roberts, Whitmarsh, & Gruffydd-Jones 2010; Westgarth et al., 2013). There is a growing research interest in the impact of human animal interactions (HAI) on human health in people with a higher risk of social isolation such as older people (Krause-Parello, 2008; Parslow, Jorm, Christensen, Rodgers & Jacomb , 2005), people with HIV (Kruger, Stern, Anstead & Finley, 2014; Siegel, Angulo, Detels, Welsch & Mullen, 1999) or people with mental or physical problems (Crawford, Worsham & Swinehart, 2006; Kwong & Bartholomew, 2011). However, little is known about the influence pets have on the general population, particularly in adolescents (Esposito, McCune, Griffin & Maholmes, 2011). Several studies have suggested attachment to pets may act as a mediating variable on the influence pets have on human health (Crawford et al., 2006; McNicholas et al., 2005; Parslow et al., 2005; Staats, Miller, Carnot, Rada, & Turnes, 1996). Conversely, only one study has properly tested this hypothesis through a mediation analysis (Krause-Parello, 2008). In Krause-Parello's study (2008) it was found attachment to pets mediated the relationship between loneliness and general health in older women living in the community (Krause-Parello, 2008). This study in line with Lazarus and Folkman stress theory (1984) considered attachment to pets as a coping mechanism of social and emotional support. It was suggested through this coping mechanism older women could attain from pets the affection and social support they were lacking from their social relationships

with a significant other. Krause-Parello's (2008) study considered loneliness as an independent variable (IV) and a general measure of health as a dependent variable (DV) within the mediation analysis. According to previous research, there is wide scientific evidence that supports how a lack of healthy and close relationships with other human beings may act as a risk factor of illness and a worst quality of life (Sanderson, 2014). Thus, Lazarus and Folkman's stress theory (1984) seems to be a logical theoretical framework when understanding the impact pets may have on human health in people with a higher risk of social isolation. However, to our knowledge, no previous studies have used this theoretical framework to understand the influence pets may have on adolescents' daily lives. In line with Headey & Grabka (2007) when understanding the benefits pets may have in human health, diverse benefits may exist between different types of pet owners (older people, shy people, sedentary people or young people who grow up with pets). This study aims to examine the potential role of pets (dogs and cats) in the association between adolescents' communication with their significant others and quality of life

*Human-animal interaction: Health benefits in adolescents?*

Most studies of pet-keeping among children and adolescents have focused on socio-demographic aspects of pet ownership (Westgarth et al., 2013), children with autism (Grandgeorge et al., 2012) or animal-assisted therapy with adolescents in psychiatric facilities (Banman, 1994). These studies do not necessarily consider the influence of attachment to pets, particularly during a period of development when social relationships with parents and friends have a particularly important influence on quality of life (Park, 2004, Shaffer &

Kipp, 2014). Headey and Grabka (2007) suggest there may be benefits to young people of growing up with pets, in terms of opportunities to develop caring behaviours and compassion, as well as the general health benefit of the development of a stronger immune system. However, HAI research often fails to analyze the influence of psychosocial factors on health benefits (Downes et al., 2009; Müllersdorf, Granström, Sahlqvist & Tillgren, 2010; Murray et al., 2010). Westgarth et al., (2013) argue that there is a need to better understand which psychosocial and demographic factors are associated with ownership of, and attachment to, different types of pets.

*Attachment to pets*

Human-pet bonds potentially have an important role in child and adolescent development and health (Covert, Whiren, Keith, & Nelson, 1985; Headey & Grabka, 2007; Marsa-Sambola et al., 2015). A pet can be accepting, openly affectionate, consistent, loyal and honest, characteristics that can fulfil a person's basic need to feel a sense of self-worth and loved (Carr et al., in press; Kwong & Bartholomew, 2011; Zilcha-Mano, Mikulincer, & Shaver, 2011a; Zilcha-Mano, Mikulincer, & Shaver, 2011b). Crawford et al., (2006) used the concept of emotional attachment to assess human-pet bonds, including characteristics of Bowlby's (1969) original infant attachment theory. Studies of human-pet attachment and interpersonal closeness (e.g., Carr et al., in press; Crawford et al., 2006; Friedmann, Son, & Tsai, 2000; Payne, Bennett, & McGreevy, 2015) suggest that there are positive effects of attachment to pets for human health. However, because different assessment tools are used, various outcomes ensue and there is no overall agreement on

health impact. Some questionnaires use items mainly focused on emotional relationships between the owner and the pet in order to be psychologically meaningful whereas others focus generally on caring, sharing and feeding activities (Anderson, 2006).

Furthermore, most research has focused on assessing the physical health benefits of pet ownership, mainly among dog owners (Gadomski, Scribani, Krupa, Jenkins, 2016; Ogechi et al., 2016). There remains a need to use measures of health that combine physical, social and psychological wellbeing such as quality of life (McNicholas et al., 2005). Despite these limitations in evidence, the possibility that attachment to pets is an emotional relationship with consequences for adolescent health and their social interactions has yet to be examined.

*Communication with parents and best friends and quality of life*

The relationships adolescents have with their parents and best friends are important in the transition from adolescence to adulthood (Hartup & Stevens, 1997; Sillars, Koerner & Fitzpatrick, 2005). Poor quality communication between adolescents and their parents, and family conflicts are associated with low self-esteem and poorer psychological well-being among adolescents (Sweeting & West, 1995; Xiao, Li, Stanton, 2011). Moreover, adolescents who have a good relationship with their parents have been found to experience higher levels of wellbeing and fewer emotional problems (Garnefski & Diekstra, 1997), fewer psychological complaints (Moreno et al., 2009) and higher perceived life satisfaction (Levin & Currie, 2010) than those who reported a bad relationship with their parents.

A good relationship with peers, specifically with a best friend, has been found to positively influence a range of developmental outcomes, such as levels of physical activity (Duncan, Duncan, & Strycker, 2005), mental health and quality of life (Shaffer & Kipp, 2013). Positive peer relationships are also a source of social and emotional support (Hartup & Stevens, 1997; Shaffer & Kipp, 2014; Widman, Choukas-Bradley, & Helms, 2014). However, there are also studies that show negative influences of peer relationships on health-related habits such as smoking (Holliday, Rothwell, & Moore, 2010) or risky sexual behaviours (Potard, Courtois, Rusch, 2008)

*The present study*

The influence of attachment to pets on adolescents' communication with their significant others (mother, father and best friend) and quality of life is the focus of this study. Pet owners often feel highly connected to their animal companions in a similar manner to members of the family (Albert & Bulcroft, 1988). For example, it has been reported that pet owners talk to their pets in a comparable way with how parents talk to their children (Mitchell, 2001). This is reinforced by Kurdek (2008), who reported that undergraduate students assessed their levels of attachment to their dogs as very similar to their attachment to family members. Investigating the implications of pet-ownership and attachment to pets for important human relationships may provide insights into how pets affect adolescents' health. This study examines two key relationships. First, it examines the influence that adolescents' communication with their significant others (mother, father and best friend) has on attachment to pets (cats and dogs). According to Walsh (2009), pets can be a key

element in bringing together family members and reducing conflicts between them. Sharing pet care activities between family members has been shown to improve interaction and communication (Melson & Fine, 2006; Sussman, 1985). In line with Headey & Grabka (2007), we might expect adolescents who have good communication with their parents and best friends to show stronger levels of attachment to their pets. However, as mentioned earlier strong attachment to pets may be a consequence of lack of social support from their social environment (Krause-Parello, 2008; McNicholas et al., 2005). Secondly the study examines the influence of attachment to pets on the association between adolescents' communication with their significant others (mother, father and best friend) and quality of life. Although it is known that better communication with parents and peers is related to higher levels of quality of life (Schaffer & Kipp, 2013), the potential influence of attachment to pets on this association has not yet been assessed. Previous studies have reported that pets may act as homeostatic regulators in social environments (Allen & Blascovich, 1996) maintaining social systems as stable and constant despite changes such family conflicts that would otherwise alter the equilibrium in social systems. This study sought to provide answers to the following questions

1. What is the relationship between adolescents' communication with their significant others (mother, father and best friend) and quality of life in adolescents?

2. What is the relationship between attachment to pets and quality of life in adolescents?

3. What is the relationship between adolescents' communication with their significant others (mother, father, best friend) and attachment to pets in adolescents?

4. Does attachment to pets mediates the effect of adolescents' communication with their significant others (mother, father and best friend) on quality of life among adolescents? (See Figure 1)

## Methods

*Participants*

The sample consisted of 2262 participants from the Scottish HBSC survey who reported they had a pet and considered it to be their own (boys = 1041; 46, girls = 1221; 54). All the participants came from three age groups sampled through cluster sampling of school classes across Scotland (11 years = 33.1%; 13 years = 33%; 15 years = 33.1%). The mean age for boys was 13.02 years old (SD = 1.50), and 13.50 years (SD = 1.60) for girls.

*Instruments*

*The Health Behaviour in School-aged Children: WHO Collaborative Cross-National Study (HBSC)* (Currie et al., 2011a) is an internationally standardized self-report questionnaire, which evaluates issues related to health in children and adolescents. From the 2010 Scottish HBSC survey the following items were chosen: "How easy is it for you to talk to your *mother/father/ best friend* about things that really bother you?" (1 = Very easy, 2 = Easy, 3 = Difficult, 4 = Very difficult, 5 = Don't have or don't see the person"). Answers from participants who marked "Don't have or don't see the person" were not

included in the analyses. For the mediation analyses, Gaito's (1980) suggestion that likert scales be treated as an ordinal scales was followed. Gaito (1980) suggests that the distance between answers to likert-type items (1=Very Easy, 2= Easy, 3=Difficult, 4=Very Difficult, 5=Don't have) is not likely to be the same (i.e., the distance between 1 and 2, 2 and 3 or 4 and 5 may be different). Following Gaito´s (1980) suggestions and taking a conservative approach with these variables, communication with parents (mother and father) and best friend were analyzed as categorical variables. These variables were dichotomised as 1(Good communication) = “Very easy” and “Easy” vs. 0 (Poor communication) = “Difficult” and “Very Difficult”. We were interested in assessing how response patterns (good communication/bad communication with father/mother/best friend) influenced quality of life and attachment to pets.

The Kidscreen 10 index (Ravens-Sieberer et al., 2010) consists of the following 10-items (that assess children’s and adolescents’ subjective health and well-being: 1) Have you felt fit and well? 2) Have you felt full of energy? 3) Have you felt sad? 4) Have you felt lonely? 5) Have you had enough time for yourself? 6) Have you been able to do the things that you want to do in your free time? 7) Have your parent(s) treated you fairly? 8) Have you had fun with your friends? 9) Have you got on well at school? 10) Have you been able to pay attention? It is a self-reported measure applicable for both healthy and chronically ill children and adolescents aged from 8 to 18 years. Each item is answered on a 5-point response scale (1=Not at all, 2=Slightly, 3=Moderately, 4=Very, 5=Extremely). Kidscreen provides a global one-dimensional score. A low score indicates poor quality of life, and a high score is indicative of better

quality of life. This is one of the most comprehensive tests for assessing Quality of Life in children and young people with high levels of validity and reliability (Erhart et al., 2009, The Kidscreen Group, 2004).

The Short Attachment to Pets Scale (Marsa-Sambola et al., 2015; Muldoon & Williams, 2010) consists of the following 9 items, focusing on aspects of attachment to pets that are salient to children and adolescents, as well as their general perceptions of animals/ pets: 1) I don't really like animals, 2) I spend time every day playing with my pet, 3) I have sometimes talked to my pet and understood what it was trying to tell me, 4) I love pets, 5) I talk to my pet quite a lot, 6) My pet makes me feel happy, 7) I consider my pet to be a friend, 8) My pet knows when I'm upset and tries to comfort me, and 9) There are times I'd be lonely without my pet. Participants were asked to answer on a 5 point Likert scale (1=*Strongly agree*, 2=Agree, 3=Not sure, 4=Disagree, 5=S*trongly disagree*). SAPS provides a global one-dimensional score. A low score indicates weak attachment to pets and a high score is indicative of stronger attachment. The test is a reliable and valid self-report tool for assessing general aspects of attachment to pets within surveys for children and young people (Marsa- Sambola et al., 2015).

*Procedure*

The data are from national surveys conducted in 2009/2010 in Scotland as part of the HBSC study. The HBSC survey is piloted in member countries (currently 43 in Europe and North America) every four years (Currie et al., 2012). The methods employed in gathering this data are described in detail elsewhere (Currie et al., 2011b). Parents had to give their consent for their

children to be part of the survey. The Ethics Committee of the Moray House School of Education, University of Edinburgh, approved the protocol. Data collection was anonymous and the demographic information collected did not permit identification of the individual student. The HBSC study uses an anonymous self-administered questionnaire, which was developed according to international standards and distributed in schools (Roberts et al., 2009).

*Statistical analysis*

Descriptive data (Means and SD), Cronbach's α, Pearson correlation coefficients (KIDSCREEN and SAPS) and point-biserial correlations (Communication with mother, father and best friend) were performed using the Statistical Package for the Social Sciences (SPSS), Version 21 for Windows (SPSS, Inc., 2010). The mediation analyses were performed through PROCESS, a freely-available statistical tool for SPSS and SAS to perform mediation, moderation, or conditional process analysis. In our analysis, adjusting for age and gender, we considered communication with mother/father/best friend as an independent variable, quality of life (KIDSCREEN) as a dependent variable, and attachment to pets (SAPS) as a mediator. Demographic variables such as gender and age are certainly associated with general health and quality of life, and research that does not adjust for these variables may lead to confusing outcomes (Michel, Bisegger, Fuhr, & Abel, 2009).

According to Baron and Kenny (1986), mediation exists when (a) the independent variable (communication with mother/father/best friend) is significantly correlated with the dependent variable (Quality of Life); (b) the

independent variable (communication with mother/father/best friend) is significantly related to the mediator (attachment to pets); c) the mediator (attachment to pets) is significantly related to the dependent variable (Quality of Life) while controlling for the independent variable (communication with mother/father/best friend); and (d) the relationship of the independent variable (communication with mother/father/best friend) with the dependent variable (Quality of Life) decreases significantly when controlled for the mediator (attachment to pets).

## Results

### *Correlational analysis*

Quality of life (KIDSCREEN) showed positive, significant relationships with attachment to pets (SAPS) and good communication with father, mother and best friend. Table 1 indicates which variables in the analyses are significantly associated with each other and justifies the use of attachment to pets as a mediator between communication with mother/father/best friend and quality of life. It also justifies the use of gender and age as control variables in further analyses.

[Insert table 1 here]

### *Mediational analyses*

#### *Adolescents with their own pet dog*

The 3 following mediation analyses are depicted in Figure 2: 1) IV: Communication with mother, M: Attachment to dogs, DV: Quality of Life; 2) IV:

Communication with father, M: Attachment to dogs, DV: Quality of Life; 3) IV: Communication with best friend, M: Attachment to dogs, DV: Quality of Life).

These analyses permitted the assessment as to whether good communication with mother (IV), father (IV) and best friend (IV) predicts quality of life (DV), and if this relationship is weaker in the presence of attachment to dogs as a mediator variable. The outcome showed that in the first group of models good communication with mother (M1: $\beta=0.57$, $t=11.33$, $p<0.001$), father (M2: $\beta=0.55$, $t=9.09$, $p<0.001$), and best friend (M3: $\beta=0.42$, $t=8.16$, $p<0.001$) predicts higher levels of quality of life. In the second group of models, when attachment to dogs (the mediator) was added into the analyses, in these models β values were reduced somewhat but were still significant for good communication with mother (M4: $\beta=0.55$, $t=11.03$, $p<0.001$), father (M5: $\beta=0.53$, $t=8.75$, $p<0.001$), and best friend (M6: $\beta=0.39$, $t=11.0318$, $p<0.001$).

Therefore, in these second group of models, attachment to dogs also predicted higher levels of quality of life (M4: $\beta=0.02$, $t=3.29$, $p=0.0010$; M5: $\beta=0.02$, $t=3.38$, $p=0.007$; and M6: $\beta=0.02$, $t=2.93$, $p=0.0034$). Attachment to dogs was found to improve the prediction of higher levels of quality of life over and above the other independent variables: communication with mother ($\Delta^2=0.02$, $F(4, 1502)=81.74$, $p<0.001$) communication with father ($\Delta^2=0.02$, $F(3, 1480)=82.27$, $p<0.001$) and communication with best friend ($\Delta^2=0.02$, $F(4, 1458)=64.22$, $p<0.001$). In the third group of models, when attachment to dogs was considered as the outcome variable, good communication with mother (M7: $\beta=0.76$, $t=3.96$, $p<0.001$), father (M8: $\beta=0.87$, $t=3.78$, $p<0.001$),

and best friend (M9: β=1.32, t=6.90, p<0.001) predicted higher levels of attachment to dogs.

A Sobel test was performed in each mediation analysis to test the mediating criteria and evaluate whether the mediating influence of attachment to dogs between adolescents' communication with their significant others (mother, father, best friends) and quality of life was statistically significant. The outcomes showed that the mediation effect of attachment to dogs was statistically significant in the 3 mediation analyses: 1) IV: Communication with mother, M: Attachment to dogs, DV: Quality of Life (z=2.48, p=0.012); 2) IV: Communication with father, M: Attachment to dogs, DV: Quality of Life (z=2.47, p=0.013) and; 3) IV: Communication with best friend, M: Attachment to dogs, DV: Quality of Life (z=2.67, p=0.007). Accordingly, this indicates that attachment to dogs partially mediates the effects of communication with mother, father and best friend on quality of life in adolescents who reported owning a dog that they consider their own. See Figure 2 for further details.

[Insert Figure 2 here]

*Adolescents with their own pet cat*

The 3 following mediation analyses are depicted in Figure 3: 1) IV: Communication with mother, M: Attachment to cats, DV: Quality of Life; 2) IV: Communication with father, M: Attachment to cats, DV: Quality of Life; 3) IV: Communication with best friend, M: Attachment to cats, DV: Quality of Life). These analyses permitted the assessment as to whether good communication with mother (IV), father (IV) and best friend (IV) predicts quality of life (DV) and if this relationship is weaker in the presence of attachment to cats as a

mediator. In the first group of models, outcomes showed that good communication with mother (M1: β=0.58, t=8.82, p<0.001), father (M2: β=0.50, t=6.06, p<0.001), and best friend (M3: β=0.42, t=5.10, p<0.001) predicts higher levels of quality of life. In the second group of models, when attachment to cats (the mediator) was added in to the analyses, β values were reduced somewhat, but were still significant for good communication with mother (M4: β=0.56, t=8.58, p<0.001), father (M5: β=0.48, t=5.88, p<0.001), and best friend (M6: β=0.39, t=5.67, p<0.001). In the second group of models, attachment to cats also predicted higher levels of quality of life (M4: β=0.03, t=3.11, p=0.0019; M5: β=0.02, t=3.43, p=0.006; and M6: β=0.02, t=5.67, p<0.001). Attachment to cats slightly improved the prediction of higher levels of quality of life over and above the following independent variables: communication with mother ($\Delta^2$=0.02, F(4, 794)=48.60, p<0.001) communication with father ($\Delta^2$=0.02, F(4, 777)=37.27, p<0.001) and communication with best friend ($\Delta^2$=0.03, F(4, 770)=36.16, p<0.001).

Furthermore, in the third group of models, when attachment to cats was considered as the outcome variable, good communication with best friend (M9: β=1.33, t=5.10, p<0.001) predicted higher levels of attachment to cats.

A Sobel test was performed in each mediation analysis to test the mediating criteria and evaluate whether the influence of attachment to cats between adolescents' communication with their significant others (mother, father and best friend) and quality of life was statistically significant. The outcomes showed that the mediation effect of attachment to pets was statistically significant in the following mediation analysis: IV= Communication with best friend, M= Attachment to dogs, DV= Quality of Life (z=2.45, p=0.014). The

Sobel test was not statistically significant in the following mediation analyses: IV= Communication with mother, M= Attachment to dogs, DV= Quality of Life (z=1.78, p=0.07); 2) IV= Communication with father, M= Attachment to dogs, DV= Quality of Life (z=1.47, p=0.140). Accordingly, attachment to cats partially mediates the effects of communication with best friend on quality of life but does not mediate the effects of communication with parents (mother and father) and quality of life.

[Insert Figure 3 here]

## Discussion

This study evaluated several mediational models in which attachment to pets (dogs and cats) served as a mediator in the relations between adolescents' communication with their significant others (mother, father and best friend) and quality of life in 11 to 15-year-old adolescents.

*Communication with parents/ best friend (IV) and Quality of Life (DV)*

Good communication with adolescents' significant others (mother, father and best friend) predicted higher quality of life among adolescents with pet dogs and cats. During adolescence parents remain a key source of social support and emotional attachment and are influential in socio-emotional development across the life-span (Kullik & Petermann, 2013; Schaffer & Kidd, 2014). Several studies have reported that good communication with parents (Crosby, 2002; Sillars, Koerner & Fitzpatrick, 2005) and friends (Hartup, 1983; Newcomb & Bagwell, 1995) have a positive impact on physical and mental health in adolescents.

*Attachment to pets (dogs and cats) as a mediator*

Attachment to pets (dogs and cats) was found in our study to serve as a psychological mechanism to improve adolescents' quality of life. This statement was supported through our mediation analyses. Attachment to pets (dogs) mediated the effect of adolescents' communication with their significant others (mother, father and best friend) on quality of life among adolescent dog owners. In cat owners, the mediation effect only appeared between communication with best friend and quality of life. The mediating effects of attachment to dogs and cats were found to be quite similar, both in terms of the degree of predictability (β values range from 0.30 to 0.61) and the effect itself ($\Delta^2$ =from 0.02 to 0.03). However, differences between the mediational role of attachment to dogs and cats could be explained by the different behavioural profiles of dogs and cats in their interactions with human beings. Dogs are more likely than cats to adapt their behaviours and emotions to emotional human signals (social referencing) (Paynet, Bennet & McGreevy, 2015). In line with this it has been suggested that dogs are also more likely than cats to see human beings as peers who frequently offer significant information about the environments (Serpell, 1996; Potter & Mills, 2015). In line with Payne et al., (2015), further HAI research should also consider the influence pets' emotional (fear, happiness) and behavioural (stranger/owner directed aggression, dog/cat directed aggression, trainability, attention seeking, and energy) responses to humans and the impact of these on human-animal interaction.

These outcomes agree with Krause-Parello's (2008) study which found that attachment to pets mediated the relationship between loneliness and general health in older females living in the community. In line with Lazarus &

Folkman's stress theory (1984), Krause-Parello's (2008) study helped to demonstrate that attachment to pets might function as a coping mechanism (social/emotional support) in the relationship between stress (loneliness) and adaptation (health). Further applications of Lazarus & Folkman's stress theory (1984) in the general population have also demonstrated problem-focused coping mechanisms (logical analysis, seeking guidance, problems solving or social/emotional support) are related to better health outcomes in the general population (Sanderson, 2014). In our representative sample of Scottish adolescents, attachment to pets (dogs and cats) mediated the relationship between adolescents' communication with their significant others (mother, father and best friend) and quality of life (Models 4-6). This finding suggests pets may also be helpful not only in people with a higher risk of social isolation but also in typical adolescent development.

*Control variables (gender and age): Communication with parents/ best friend (IV) and Quality of Life (DV)*

Younger age and male gender predicted better levels of quality of life in adolescents who reported owning dogs and cats, even when attachment to these pets was considered as the mediator variable. Previous research has highlighted early adolescence (11-13 years old) and female gender was associated with lower quality of life for a variety of reasons relating to adolescent development including puberty and social development (Hampel, 2007; Patton & Vinner, 2007; Plancherel & Bolognini, 1995). Young female adolescents are more likely than young adolescent males to experience rapid physiological changes like the menarche and imbalance of hormonal status

(Patton & Viner, 2007), more stressful events (Nolen-Hoeksema, Girgus & Seligman, 1991), and as a consequence, poorer psychological well-being (Gadin & Hammastrom, 2005; Kuehner, 2003; Steinberg & Morris, 2001).

*Attachment to pets (IV) and quality of life (DV)*

While controlling for communication with parents and best friend (Models 4-6), attachment to dogs and cats predicted higher levels of quality of life. In line with Julius, Beetz, Turner, Uvnäs-Moberg, & Kotrschal, (2013) these findings suggest that adolescent dog and cat owners with high levels of attachment to their pets may engage in positive human-animal interactions that support quality of life. Several studies have suggested that taking care of a pet helps owners learn how to be more responsible (Siegel, 1990), increases opportunities to interact with other human beings (Julius et al. 2013; McNicholas et al., 2005; Robin & Bensel, 1985), and provides benefits from sharing secrets and mood states with a non-judgmental "loyal friend" (Zilcha-Mano et al., 2011a). Cat and dog owners may differ in personality variables, which might also relate to their ability to form and maintain social bonds with their pets and other human beings. Studies have found adult dog owners tend to show lower levels of neuroticism and high levels of agreeableness and extroversion whereas adult cat owners tend to show higher levels of neuroticism and openness and lower levels of extraversion, agreeableness and conscientiousness (Gosling, Sandy & Potter, 2010; Payne et al., 2015; Kis, Turcsán, & Gácsi, 2012). This might explain why attachment to dogs and cats showed differential mediation effects in our study. Further research should replicate our results by testing the influence (mediation or moderation)

of human personality variables on owner-pet interactions and the way in which human beings relate to other human beings through their pets

Our results are also in line with previous research that shows a ‘pet effect’ on adult health. For example, dog and cat owners have been found to use health care systems less than people with no pets (Headey, 1999). Other studies using general measures of pet ownership report improved survival rates from myocardial infarction (Friedmann, Katcher, Lynch & Thomas, 1980), a lower risk of heart disease (Anderson, Reid & Jennings 1992) and better psychological health (Straede & Gates,1993) compared with people who have no pets. Among children and adolescents, it has also been found that exposure to pet allergens when young, leads to reduced occurrence of allergic rhinitis and asthma later on (Nafstad, Magnus, Gaarder, & Jaakkola 2001; Owby, Johnson & Peterson, 2002). Pet owners have also been found to have lower rates of absenteeism from school (McNicholas et al., 2005).

*Communication with parents/best friend (IV) and attachment to pets (DV)*

It was also found a higher attachment to pets (dogs) was also explained by a good communication with the significant others (mother, father, best friend) in adolescent dog owners (Model 7-9). In cat owners only good communication with best friends predicted higher levels of attachment (Model 9). In adolescent dog owners, due to the demanding levels of care, adolescents and their parents could share care activities such as feeding or walking the dog (Julius et al., 2013). Through these shared activities, parents may verbalize caring skills to their children that may help to improve the attachments adolescents have with their dogs. Aspects such as sensitivity, positive affect,

affection, synchrony, mutuality, support and stimulation (De Wolf & Ijzendoon, 1997) could be taught through caring, feeding, walking and playing activities with pets.

Regarding adolescent dog and cat owners, the relationship between better communication with a best friend and higher levels of attachment to these pets could also be explained by social imitation (Bandura, 1986). Adolescent dog and cat owners could share their own positive caring activities with their best friends, which would help to improve and/or reinforce the levels of attachment adolescents have with their pets. According to Cain (1985) pets may be seen as the ‘‘glue’’ that unifies family members and increases family cohesion. Walsh (2009) also suggests that pets may improve daily family life and promote greater interaction and communication within the family. Similar effects could also happen with adolescents and their friends.

*Control variables (gender and age): Communication with parents/ best friend (IV) and Attachment to pets (DV)*

Lower age together with the female gender predicted stronger levels of pet attachment in adolescents. Previous studies have reported similar results in children (Vidovic , Stetic, & Bratko, 1999) and adults (Holcomb, Williams, & Richards, 1985; Kidd & Kidd 1990). Kellert (1985) suggests that females tend to have stronger humanistic and moralistic attitudes than males. However, Ganster and Voith (1983) and Stevens (1990) found no significant differences between gender and generalised attachment to pets. These contrasting results could be explained by the use of different scales and/or populations assessed (Marsa-Sambola et al., 2015; Stevens, 1990; Westgarth et al., 2013). Regarding age, higher levels of attachment to dogs and cats were

associated with the lower age group. This is consistent with previous studies that highlight a decline in adolescent's interest in animals with age (Prokop & Tunnicliffe, 2010; Williams, Muldoon, & Lawrence, 2010). This may be related to a greater interest in socializing with best friends, rather than the family (Vidovic et al., 1999).

*Limitations*

Some limitations of the present study should be considered. First, our study focused on assessing cross-sectional relationships between variables. In order to assess the causal effects of our variables a longitudinal study is required. Second, in our study, we were not able to gather information about attachment to parents and best friends and the influence these variables may have in the relationship between adolescents' communication with their significant others (father, mother and best friend) and attachment to pets. Further studies should replicate our analyses adding reliable and valid measures of attachment to parents and best friends to analyze the influence of internal working models of human attachment on attachment to pets.

*Implications*

These results may support Headey & Gabka's (2007) study which suggests different types of pet owners (older people, shy or lonely people, sedentary people and young people) may benefit in different ways of pets' company. Specifically, they stated benefits to young people who grow up with pets may involve both being socialized to look after others and to have a stronger immune system. From our analyses it can also be stated attachment to pets

(dogs and cats) may also improve adolescent's quality of life and communication with their significant others.

Social contact has long been viewed as important in staving off social isolation and feelings of loneliness, as well as facilitating access to social support. As McNicholas & Collis (2000) argue, pets appear to act as "social catalysts", inducing social contact between people. Caring and playing with dogs and cats may facilitate communication with others through shared emotional bonds with the pet, and also ensures that basic pet care such as feeding, walking and grooming have been carried out. Although it has been stated this is more likely to happen with people with a higher risk of social isolation (Allen, Kellegrew & Jaffre, 2000; Banks & Banks, 2002; Cherniack & Cherniack, 2014; Grandgeorge et al., 2012; Hutton, 2015; Krause-Parello, 2008; Lane, McNicholas & Collis, 1998; Siegel, 1990; Siegel et al., 1999; Zimolag & Krupa, 2009), the evidence from this study suggests it may also happen in typical adolescent development. In line with Siegel (1990), we argue that the main health benefits in human-animal interactions ensue when the person plays a significant role in caring for the pet and is highly attached to them. We have demonstrated that attachment to pets affects physical, psychological and social components of wellbeing, as captured by KIDSCREEN showing the breadth of the pet effect on adolescent wellbeing (McNicholas et al., 2005).

*Conclusion*

Higher levels of attachment to dogs and cats in adolescents may improve their quality of life and enhance communication with parents and best friends.

These phenomena can be explained by the caring activities related to dog and cat ownership.

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Table 1. Correlations, means, standard deviations and Cronbach's α for all the variables in the study.

| Dogs | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| (1)Age | 1 | -.022 | -.294** | .115** | .174** | -.067** | -.299** |
| (2)gender | -.022 | 1 | -.112** | .157** | -.013 | -.190** | .086** |
| (3) Quality of Life | -.294** | -.112** | 1 | -.282** | -.328** | -.171** | .177** |
| (4) Father communication | .115** | .157** | -.282** | 1 | .398** | .170** | -.017 |
| (5) Mother communication | .174** | -.013 | -.328** | .398** | 1 | .239** | -.084** |
| (6) Best friend communication | -.067** | -.190** | -.171** | .170** | .239** | 1 | -.066** |
| (7) Attachment to dogs | -.299** | .086** | .177** | -.017 | -.084** | -.066** | 1 |
| Mean & SD | | | 46.08±9.17 | | | | 35.16±3.84 |
| Cronbach's α | | | 0.82 | | | | 0.83 |
| Cats | | | | | | | |
| (1)Age | 1 | -.006 | -.294** | .133** | .164** | -.079** | -.296** |
| (2)gender | -.006 | 1 | -.104** | .202** | .042 | -.190** | .156** |
| (3) Quality of Life | -.294** | -.104** | 1 | -.276** | -.353** | -.169** | .197** |
| (4) Father communication | .133** | .202** | -.276** | 1 | .417** | .133** | -.004 |
| (5) Mother communication | .164** | .042 | -.353** | .417** | 1 | .224** | -.074* |
| (6) Best friend communication | -.079** | -.190** | -.169** | .133** | .224** | 1 | -.143** |
| (7) Attachment to dogs | -.296** | .156** | .197** | -.004 | -.074* | -.143** | 1 |
| Mean & SD | | | 46.60±9.65 | | | | 35.36±3.86 |
| Cronbach's α | | | 0.80 | | | | 0.82 |

Note: *p<.05, **p<.01

Figure 1. The theoretical model proposing that attachment to pets mediates the effect of adolescents' communication with their significant others and quality of life.

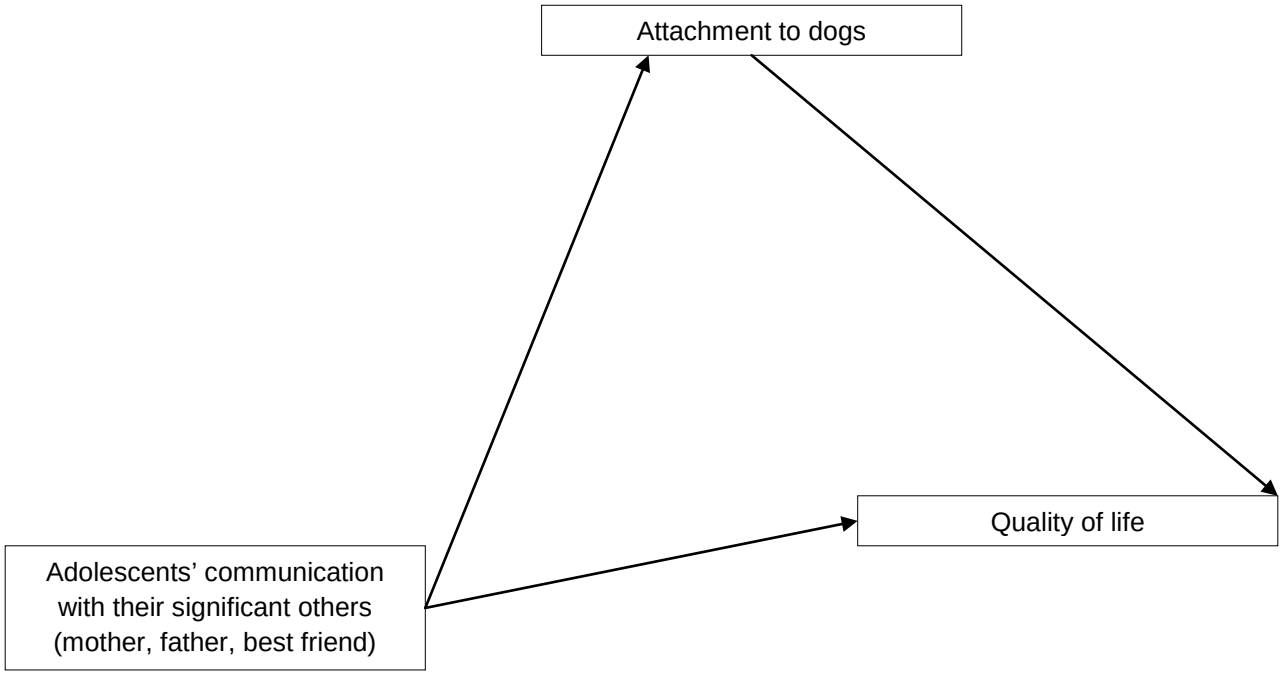
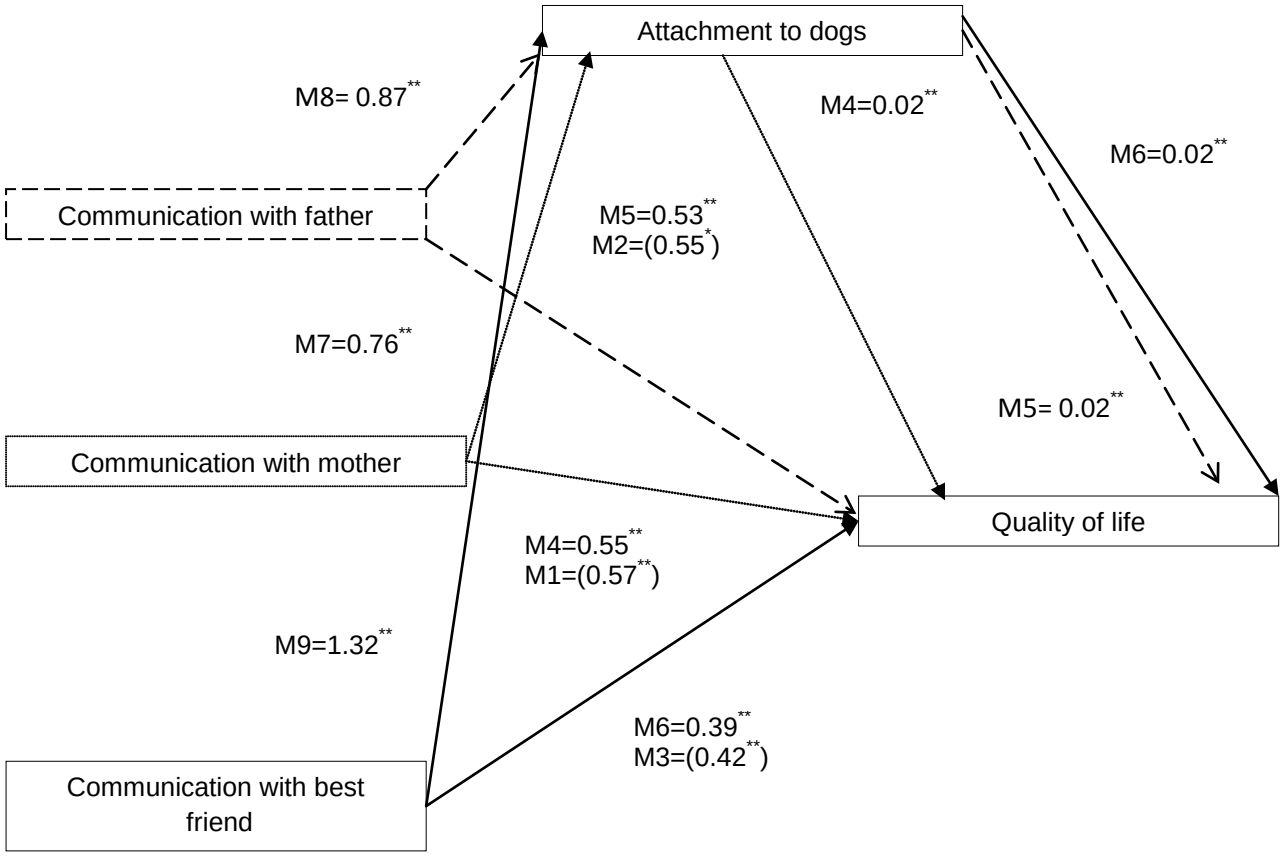
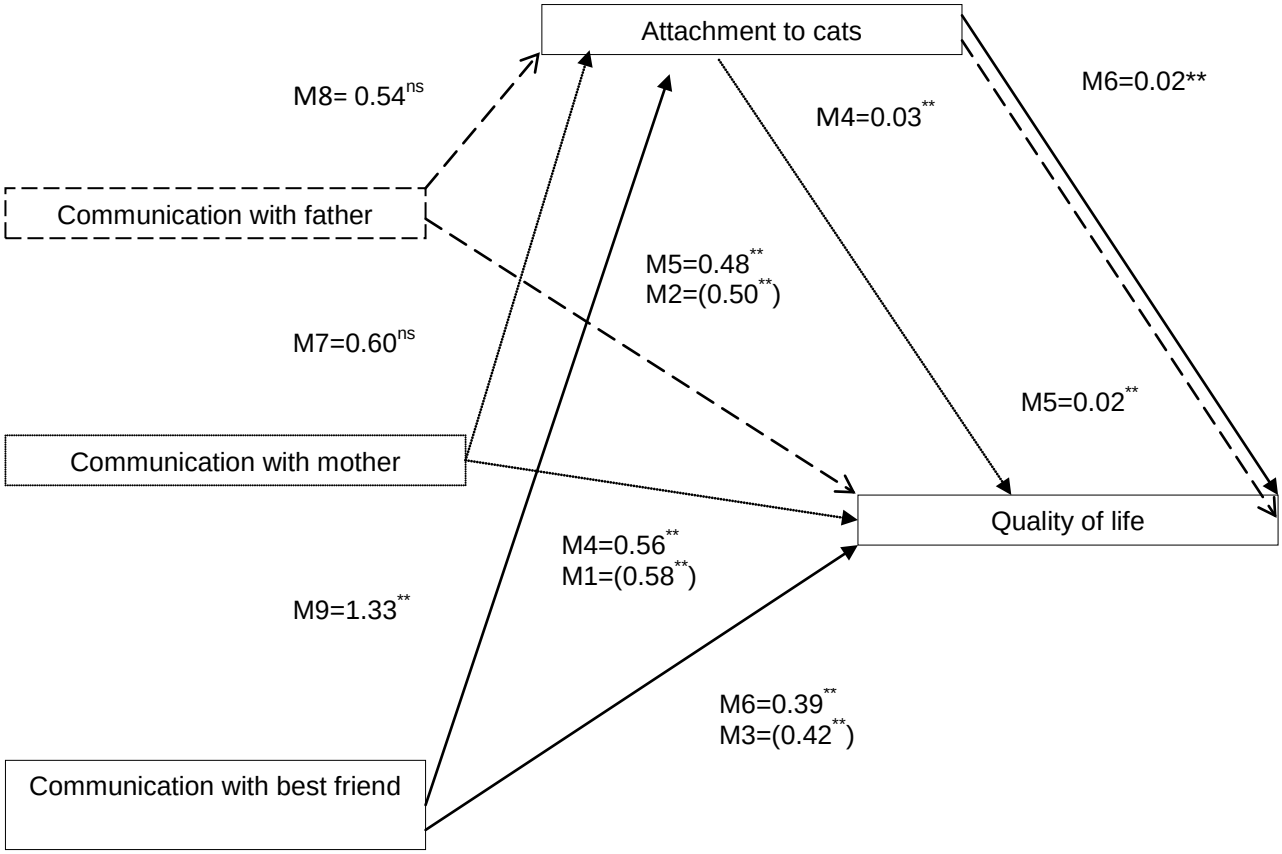


Figure 2. Mediation analyses: Dog owners.




| Model | Mediation analyses (N=1463) | | |
|---|---|---|---|
| – –> | (X) Communication with father, (Y)Quality of Life, (M) Attachment to dogs (Z= 2.67 p=0.007) | | |
| | DV: QoL | DV: QoL (Attachment) | DV:Attachment |
| age | β=-0.15, t=-10.15, p<0.001 | β=-0.13, t=-8.92, p<0.001 | β=-0.61, t=-10.82, p<0.001 |
| gender | β=-0.24, t=-4.98, p<0.001 | β=-0.25, t=-5.26, p<0.001 | β=0.60, t=3.25, p<0.001 |
| ⇢ | (X) Communication with mother, (Y) Quality of Life, (M) Attachment to dogs (Z= 2.47 p=0.013) | | |
| | DV: QoL | DV: QoL (Attachment) | DV: Attachment |
| Age | β=-0.16, t=-10.83, p<0.001 | β=-0.16, t=-10.83, p<0.001 | β=-0.14, t=-9.50, p<0.001 |
| gender | β=-0.16, t=-3.28, p<0.001 | β=-0.16, t=-3.28, p<0.001 | β=-0.18, t=-3.60, p<0.001 |
| ⟹ | (X) Communication with best friend, (Y) Quality of Life, (M) Attachment to dogs (Z= 2.48 p=0.012) | | |
| | DV: QoL | DV: QoL (Attachment) | DV: Attachment |
| Age | β=-0.19, t=-13.06, p<0.001 | β=-0.18, t=-11.61, p<0.001 | β=-0.67, t=-12.02, p<0.001 |
| gender | β=-0.30, t=-5.99, p<0.001 | β=-0.31, t=-6.14, p<0.001 | β=0.37, t=1.91, p=0.040 |

Figure 3. Mediation analyses: Cat owners




| Model | Mediation analyses (N=799) | | |
|---|---|---|---|
| – – → | (X) Communication with father, (Y)Quality of Life, (M) Attachment to cats (Z= 1.47 p=0.140) | | |
| | DV: QoL | DV: QoL (Attachment) | DV: Attachment |
| age | β=-0.15, t=-7.92, p<0.001 | β=-0.13, t=-6.70, p<0.001 | β=-0.67, t=-8.65, p<0.001 |
| gender | β=-0.13, t=-2.12, p<0.001 | β=--0.17, t=-2.63, p<0.001 | β=1.26, t=4.90, p<0.001 |
| ⋯→ | (X) Communication with mother, (Y) Quality of Life, (M) Attachment to cats (Z= 1.78 p=0.074) | | |
| | DV: QoL | DV: QoL (Attachment) | DV: Attachment |
| Age | β=-0.16, t=-8.26, p<0.001 | β=-0.14, t=-6.91, p<0.001 | β=-0.64, t=-8.70, p<0.001 |
| gender | β=-0.19, t=-1.35, p<0.001 | β=-0.13, t=-1.91, p<0.001 | β=1.25, t=4.73, p<0.001 |
| ⟹ | (X) Communication with best friend, (Y) Quality of Life, (M) Attachment to cats (Z= 2.45 p=0.014) | | |
| | DV: QoL | DV: QoL (Attachment) | DV: Attachment |
| Age | β=-0.19, t=-9.70, p<0.001 | β=-0.17, t=-8.34, p<0.001 | β=-0.71, t=-9.30, p<0.001 |
| gender | β=-0.25, t=-3.62, p<0.001 | β=-0.27, t=-3.96, p<0.001 | β=0.91, t=3.44, p<0.001 |

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